Claims

1. A non-aqueous well bore treatment fluid for selectively reducing the outflow of water during recovery of hydrocarbons from a hydrocarbon reservoir in a formation, the fluid containing 5 to 40 weight per cent of a water-immiscible dissolved compound based on α-branched carboxylic acid, derivatives or co-polymers thereof, and capable of forming a precipitate that is substantially soluble in hydrocarbons and substantially insoluble in water.

2. A well bore treatment fluid according to claim 1, wherein the precipitate is soluble to at least 5.0 wt % in hydrocarbons.

3. A well bore treatment fluid according to claim 2, wherein the precipitate is soluble to at least 10.0 wt % in hydrocarbons.

4. A well bore treatment fluid according to any one of the preceding claims, wherein the precipitate is less than 1.0 wt % soluble in water.

5. A well bore treatment fluid according to claim 4, wherein the precipitate is less than 0.10 wt % soluble in water.

6. A well bore treatment fluid according to any one of the preceding claims, wherein the melting point of the precipitate is over 50°C.

7. A well bore treatment fluid according to claim 6, wherein the melting point of the precipitate is over 100°C.

8. A well bore treatment fluid according to any one of the preceding claims, which is solvent-based.

9. A well bore treatment fluid according to any one of claims 1 to 7, which is oil-based.

10. A well bore treatment fluid according to any one of claims 1 to 7, which is based on a mixture of solvent and oil.

11. A well bore treatment fluid according to any one of claims 1 to 7, which is based on a mixture of solvent and water.

12. A well bore treatment fluid according to any one of the preceding claims, wherein the precipitate is a divalent or trivalent metal salt of an α-branched carboxylic acid.

13. A well bore treatment fluid according to claim 12, wherein the precipitate has the structure:

$(R_1COO^-)_nM^{n+}$

wherein:

R_1 is a C_{30}-C_5 aliphatic group having a C_{20}-C_4 linear chain bonded at a terminal carbon atom thereof (the α carbon atom) to the carbon atom of the carboxyl (COO) group, and further having at least one C_1, C_2 or C_3 side group bonded to said terminal carbon atom, and

M is a divalent or trivalent metal cation.

14. A well bore treatment fluid according to claim 13, wherein two of said side groups are bonded to said terminal carbon atom.

15. A well bore treatment fluid according to claim 13, wherein the precipitate has the structure:

$(R_2COO^-)_nM^{n+}$

wherein:

R_2 is a C_{10}-C_{30} cyclyl group bonded at a carbon atom thereof (the α carbon atom) to the carbon atom of the carboxyl (COO) group, and having at least one C_1, C_2 or C_3 side group bonded to the α carbon atom, and

M is a divalent or trivalent metal cation.

16. A well bore treatment fluid according to claim 15, wherein R_2COO^- is an abietate group.

17. A well bore treatment fluid according to claim 1, wherein the compound is immiscible in a solvent fully miscible with water.

18. A well bore treatment fluid according to claim 1, wherein the α-branched carboxylic acid is abietic acid.

19. A well bore treatment fluid according to claim 18, wherein the precipitate is a divalent or trivalent metal salt of abietic acid.

20. A well bore treatment fluid according to claim 18, wherein the precipitate is polymerised abietic acid.

21. A well bore treatment fluid according to claim 18, wherein the precipitate is a divalent or trivalent metal salt of polymerised abietic acid.

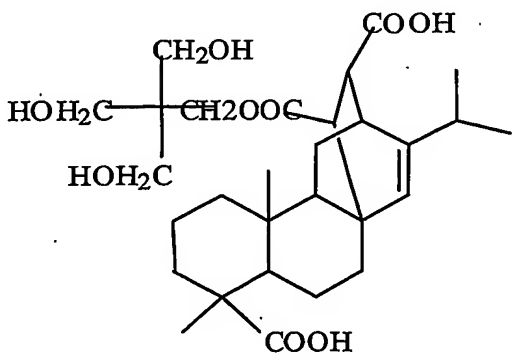
22. A well bore treatment fluid according to claim 18, wherein the precipitate is a phenolic co-polymer of abietic acid.

23. A well bore treatment fluid according to claims 1, wherein the dissolved compound is a divalent or trivalent metal salt.

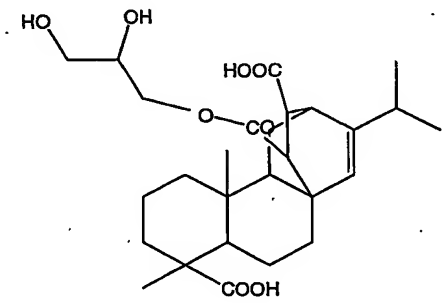
24. A well bore treatment fluid according to claim 23, wherein the divalent metal is calcium, magnesium or zinc.

25. A well bore treatment fluid according claim 1, wherein said dissolved compound is a precursor, the precursor being degradable to form the carboxylate anion of a divalent or trivalent metal salt.

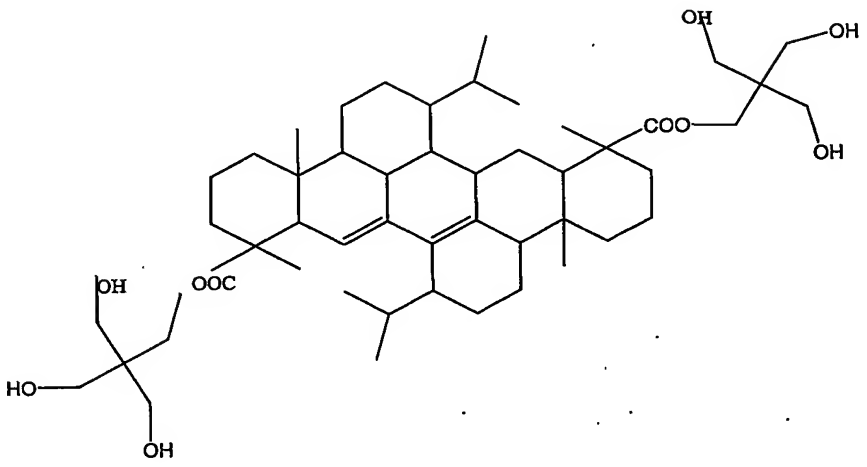
26. A well bore treatment fluid according to claim 1, wherein the precipitate has the structure:



27. A well bore treatment fluid according to claim 1, wherein the precipitate has the structure:



28. A well bore treatment fluid according to claim 1, wherein the precipitate has the structure:



29. A method of reducing the outflow of water during recovery of hydrocarbons from a hydrocarbon reservoir in a formation, comprising:

(a) providing a well bore treatment fluid according to claim 1, and

(b) injecting said fluid into a well bore; and

(c) letting the fluid permeate formation surrounding the well bore to reduce the outflow of water therefrom.

30. The method of claim 29, comprising:

(a) providing a well bore treatment fluid according to claim 1, and

(b) injecting said fluid into a well bore; and

(c) letting the fluid permeate formation surrounding the well bore to form precipitates in the presence of water in the formation to reduce the outflow of water therefrom.

31. A method according to claim 29, wherein formation comprises a multi-layered reservoir with each layer having a flowpath into the wellbore.

32. A method according to claim 29, further comprising the step of injecting acid into the well bore.

33. A method according to claim 29, further comprising the step of injecting acid into the well bore after injection of the well bore treatment fluid.

34. A method according to claim 29, further comprising the step of delaying precipitation.

35. A method according to claim 30, wherein precipitation is delayed by injecting a spacer fluid into the formation before the treatment fluid.

36. A method according to claim 29, further comprising:
(d) injecting water or brine into the formation.

37. A method according to claim 36, wherein the steps of injecting of treatment fluid and injection of water or brine are repeated to enhance the blocking of water in the formation.

38. A method according to claim 29, further comprising the step of reversing flow direction in the well bore to resume hydrocarbon production.